

CLAIMS

What is claimed is:

1. A computer controlled machine for forming at least one tooth on a workpiece with a cutting tool, said cutting tool being reciprocated to define a tool stroking motion wherein said tool stroking comprises a cutting stroke and a return stroke, and wherein said return stroke is carried out at a speed faster than the speed of said cutting stroke,

said machine comprising a rotatable element associated with the reciprocation of said cutting tool, said element including at least one detectable surface positioned thereabout,

a position sensor located adjacent said element and detectable surface,

whereby during rotation of said element, the passing of a leading edge of said at least one detectable surface proximate said position sensor at the beginning of said return stroke results in a signal being sent to the computer to effect an increase in the speed of the return stroke relative to the speed of said cutting stroke, and wherein passing of a trailing edge of said at least one detectable surface proximate said position sensor at the end of said return stroke or at the beginning of said cutting stroke results in a signal being sent to the computer to effect a return to the speed of the cutting stroke.

2. The machine of claim 1 wherein said detectable surface comprises a single surface having a leading edge and a trailing edge.

3. The machine of claim 1 comprising two detectable surfaces.

4. The machine of claim 1 wherein said rotatable element comprises a tool spindle drive shaft.

5. The machine of claim 1 wherein said rotatable element comprises a back-off cam drive shaft.

6. The machine of claim 1 wherein said rotatable element comprises a crank.

7. The machine of claim 1 wherein said rotatable element comprises a tool spindle.

8. The machine of claim 1 wherein said position sensor comprises a non-contact proximity sensor.

9. The machine of claim 1 wherein said at least one detectable surface extends generally 180 degrees about said rotatable element.

10. A computer controlled gear shaping machine for forming at least one tooth on a workpiece with a cutting tool, said cutting tool being reciprocated to define a tool stroking motion wherein said tool stroking comprises a cutting stroke and a return stroke, and wherein said return stroke is carried out at a speed faster than the speed of said cutting stroke,

said machine comprising a rotatable element associated with the reciprocation of said cutting tool, said element including a detectable surface positioned thereabout, said detectable surface comprising a leading edge and a trailing edge,

a position sensor located adjacent said element and detectable surface,

whereby during rotation of said element, the passing of said leading edge of said detectable surface proximate said position sensor at the beginning of said return stroke results in a signal being sent to the computer to effect an increase in the speed of the return stroke relative to the speed of said cutting stroke, and wherein passing of said trailing edge of said detectable surface proximate said position sensor at the end of said return stroke or at the beginning of said cutting stroke results in a signal being sent to the computer to effect a return to the speed of the cutting stroke.

11. The machine of claim 10 wherein said rotatable element comprises a tool spindle drive shaft.

12. The machine of claim 10 wherein said rotatable element comprises a back-off cam drive shaft.

13. The machine of claim 10 wherein said position sensor comprises a non-contact proximity sensor.

14. The machine of claim 10 wherein said at least one detectable surface extends generally 180 degrees about said rotatable element.

15. A method of forming toothed articles on a computer controlled machine with a reciprocating cutting tool, said reciprocating comprising a cutting stroke and a return stroke, said method including:

- carrying out said return stroke at a speed greater than the speed of the cutting stroke, the greater speed of the return stroke being effected by,
- selecting a rotatable machine element associated with the reciprocation of said cutting tool,
- positioning a detectable surface about said machine element, said detectable surface comprising a leading edge and a trailing edge,
- locating a position sensor adjacent said element and detectable surface,
- passing said leading edge of said detectable surface proximate said position sensor at the beginning of said return stroke thereby resulting in a signal being sent to the computer to effect an increase in the speed of the return stroke relative to the speed of said cutting stroke, and,
- passing of said trailing edge of said detectable surface proximate said position sensor at the end of said return stroke or at the beginning of said cutting stroke thereby resulting in a signal being sent to the computer to effect a return to the speed of the cutting stroke.